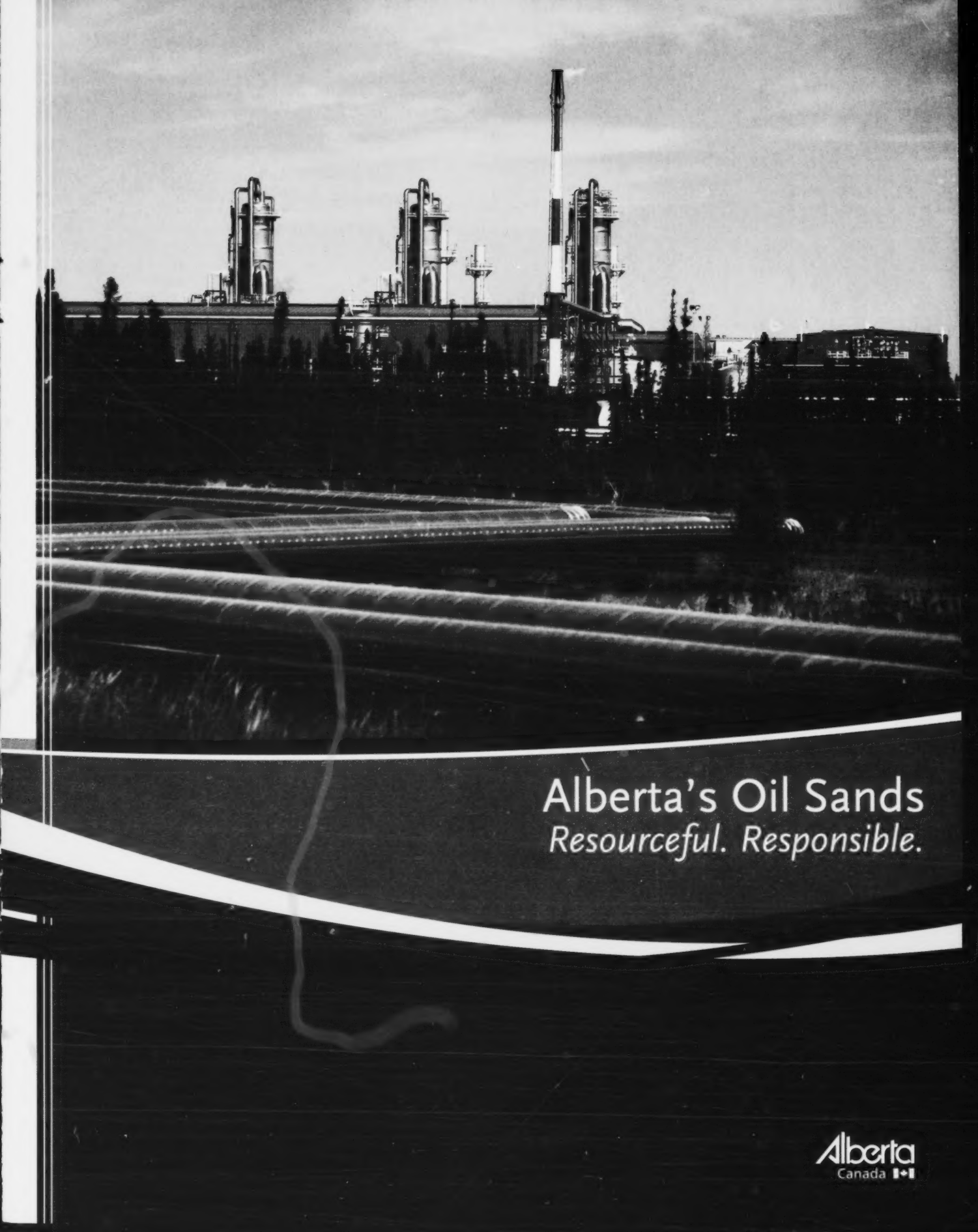

Alberta's Oil Sands
Resourceful. Responsible.
Alberta
Canada

Athabasca River with oil sands facilities in the distance.

JWP Publishing/Joey Podlubny

# INTRODUCTION

Two energy truths face the world in the 21st century: worldwide energy demand is expected to grow by 50 per cent by 2030, and fossil fuels continue to be the dominant form of energy—accounting for 86 per cent of global consumption.

Alberta, Canada is positioned to play a major role. The western province ranks second only to Saudi Arabia in global, proven energy reserves. Most of these reserves are found in the oil sands.

Until recently, Alberta's oil sands were considered too remote, too difficult to extract and too expensive to produce. New technology, Albertan determination and higher oil prices have turned this Canadian long shot into an economic success story that holds the key to continental energy security.

Developing this oil resource is not without its critics. There are concerns with the environmental impact of development on such a large scale. The oil sands are receiving international attention in the debate about climate change and the world's dependence on oil.

The debate is intensifying. People and governments around the globe are forming strong opinions on what the oil sands represent. The world's spotlight is now shining squarely on Alberta's oil sands.

The Alberta government and industry know this, and understand that energy resources must be produced in a responsible manner. Albertans demand that. So does the rest of the world.

Albertans have always valued the environment and had a close connection to the land. The land has been a source of pride, a place for recreation and the backbone of a province that has relied on agriculture, forestry and energy development to grow. This sense of stewardship continues with the oil sands as Alberta continues to seek balance between protection and prosperity.

This booklet outlines the steps being taken by the Alberta government and industry to develop the oil sands in an environmentally sound way. It presents information on:

- Alberta's vision for developing one of the world's largest deposits of oil
- legislation and policies that protect water, air, land and ecosystems in the oil sands region
- steps taken to limit greenhouse gas emissions from oil sands production
- the economic value of this industry across Canada

For more information on Alberta's oil sands, visit **www.oilsands.alberta.ca**.

# OIL SANDS PRIMER

Oil sands are naturally occurring mixtures of sand or clay, water and a thick, heavy type of petroleum called bitumen. Bitumen will not flow unless it's heated or diluted. At room temperature it acts much like cold molasses.

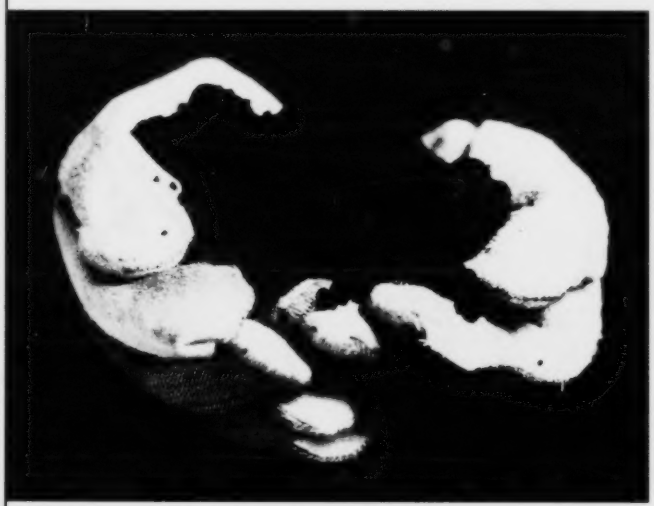
In the past, bitumen was used to waterproof boats and even as a coating for buildings. The Greek historian Herodotus said hot bitumen was used as mortar in the walls of Babylon. Bitumen was also used in early photographic technology.

Alberta contains the largest concentration of oil sands in the world. Alberta's three major areas contain approximately 1.7 trillion barrels of bitumen in place.

Proven measures indicate there are 173 billion barrels of recoverable oil in the oil sands.

The people of Alberta own the oil sands resource, while industry purchases the right to explore for, extract and develop the resources. Industry pays royalties back to the owners through the Alberta government. In the 2006-07 fiscal year the province collected $2.4 billion in royalties from oil sands production.

While bitumen exists naturally in Alberta, it must be recovered and processed to separate it from the sands and produce consumer products like gasoline.



Bitumen is recovered in two ways. For oil sands near the surface, it can be mined and transported by trucks to a cleaning facility where the sand is mixed with warm water to separate the bitumen.

For oil sands further beneath the surface, it is more practical to extract by in-situ (Latin for 'in-place') methods. The most common in-situ method separates the bitumen from the sand underground by using steam to heat it to a point that allows it to be pumped by a well to the surface. In-situ processes have a significantly smaller footprint on the landscape, as they use about 15 per cent of land disturbed by mining and do not produce tailing ponds.

Approximately 80 per cent of Alberta's recoverable oil sands will be extracted through in-situ production, with only 20 per cent recoverable by mining.

## OIL SANDS OR TAR SANDS?

The hydrocarbon mixtures found in northern Alberta have historically been referred to as tar, pitch or asphalt. However, oil sands is now used most often to describe the naturally occurring bitumen deposits. This helps distinguish it from the other terms, which are associated with distilled or man-made products, such as the mixtures used to pave roads.

Oil sands is a more accurate term because bitumen is a substance that contains oily sand. The resource is composed of three main elements: sand, water and bitumen. Regardless of the name, oil sands and tar sands describe the same thing.

## STEPS TO DEVELOPMENT IN THE OIL SANDS

1. **A private company purchases mineral rights for a specific area.**
2. **The company consults with First Nations groups in the area.**
3. **The company makes an application for development to the Alberta Energy Resources Conservation Board (ERCB), which regulates safe, responsible and efficient development of Alberta's energy resources.**
4. **An environmental impact assessment, water use request and socio-economic impact study are submitted by the developer to the Alberta government.**
5. **Public hearings may be held.**
6. **A decision on the project application is made in the public's interest by the ERCB.**
7. **If approved, development proceeds based on terms set out in the project approval.**
8. **Annual reporting and 10-year renewal required.**

In 2006, bitumen production averaged 1.25 million barrels a day through 87 producing oil sands projects in Alberta.

Due to the nature of developing the oil sands, industry faces significant challenges to reduce the amount of greenhouse gas (GHG) emissions, water and natural gas required to create a barrel of refined oil. It takes more effort to produce heavy oils, including oil from the oil sands, than conventional oil. But new technologies are reducing the footprint of oil sands development.

# ENVIRONMENTAL PROTECTION IN THE OIL SANDS

**Alberta is a committed steward of our natural resources. We are working to ensure oil sands are developed in an environmentally responsible way.**

Alberta has, and continues to prove that environmental protection and economic development can happen at the same time.

The provincial government shows leadership through legislation and policies involving land reclamation, water use, air quality, and human and ecosystem health.

Current production methods mean that more energy is needed to extract oil from the oil sands compared to conventional oil. But the gap is closing. Technology continues to advance, reducing the energy and environmental impact of oil sands recovery.

**Per barrel of oil, carbon dioxide emissions have been reduced by 45 per cent since 1990.**

## LEGISLATION

The Alberta government works with affected stakeholders—including industry, municipalities, environmental organizations and Aboriginal communities—to develop environmental laws that work.

Stringent legislation and on-the-ground measures are in place to protect the air, land and water during oil sands development. And government is continuously making improvements to balance the protection of the environment and the development of this valuable resource.

**In 2007, Alberta became the first in North America to legislate mandatory greenhouse gas reductions for large industrial facilities.**

Alberta's large industrial facilities were required to reduce their emission intensity by 12 per cent, as of the end of 2007.

Results for the first year show that companies made 2.6 million tonnes of actual reductions through operational changes and practices—including better use and re-use of energy—and investing in offsets created by other Alberta projects. Companies also chose to pay approximately $40 million into the Climate Change and Emissions Management Fund, which will invest in projects and technology to reduce GHG emissions.

## ▸ FIRST OIL SANDS RECLAMATION CERTIFICATE

A 104-hectare (257-acre) parcel of land known as Gateway Hill has been issued the first oil sands reclamation certificate by the Alberta government.

The site was used by Syncrude Canada Ltd. for placement of overburden material removed during oil sands mining. By the early 1980s, the area was no longer needed and reclamation began.

Today, it is a rolling forested area with hiking trails and lookout points.

Gateway Hill, first fully reclaimed area in the oil sands region.

## PROTECTING THE LAND

Under Alberta's strict reclamation standards, companies must remediate and reclaim land so it can be productive again.

Alberta's reclaimation standards require the land be able to support a range of activities similar to its previous use before oil sands development.

To date there are 530 square kilometres (205 square miles) of land that has been disturbed by oil sands mining activity—which is less than the area of the City of Edmonton, and one-third the area of metro Los Angeles.

As of March 2008, approximately 65 square kilometres (25 square miles) are in the process of being reclaimed. Industry must submit reclamation plans for approval to the Alberta government, which then issues a final certificate once work is sufficiently completed.

By law, industry must post financial security equivalent to the cost of reclamation before beginning oil sands activity. This money is kept in the Environmental Protection Security Fund and returned to industry when reclamation certificates are issued. As of June 2008, the fund held $721 million.

It takes time to adequately reclaim land—in some cases up to 50 years. But work is progressing to return the disturbed land to a natural state after development. For example, major oil sands companies have planted more than 7.5 million tree seedlings towards their reclamation efforts.

While oil sands operations are required to meet already high standards, the Alberta government is putting tighter timelines for reclamation in place for the growing number of less surface-intensive in-situ operations.

## PROTECTING THE WATER

**Limiting water use**

Alberta places strict limits on industry water use. The Water Management Framework for the Lower Athabasca River puts a weekly cap on how much water oil sands companies can remove, which is tied to fluctuating flow of the river.

All existing and approved oil sands projects together will withdraw less than three per cent of the average annual flow of the Athabasca River.

During periods of low river flow, water consumption is limited to the equivalent of 1.3 per cent of annual flow. At times, this can mean industrial users will be restricted to less than half of their normal requirement. This framework is one of the most protective policies to apply to year-round water withdrawals in a northern climate anywhere in the world.

Limiting withdrawals encourages each oil sands operation to conserve water and ensures healthy aquatic ecosystems—a key element of Alberta's *Water for Life* strategy—the province's plan for the wise management of water.

Alberta is constantly looking for ways to reduce the amount of fresh water used in oil sands operations. Up to 90 per cent of the water used is recycled, depending on the maturity of the facility and extraction process used. As well, certain in-situ extractions in the Cold Lake deposit are using brackish water from deep underground salt water aquifers instead of drawing from fresh surface water.

**Ensuring water quality**

Industry is prohibited from discharging untreated process water from oil sands projects into the Athabasca River at the penalty of prosecution.

The Alberta government has been monitoring water quality in the oil sands region since the early 1970s. Its first priority is to ensure water quality is not compromised for communities downstream.

# ENVIRONMENTAL PROTECTION IN THE OIL SANDS

In additional to provincial monitoring, the Regional Aquatics Monitoring Program (RAMP), which began in the early 1990s, collects and assesses thousands of water samples from across the region each year.

RAMP is a community-based program that involves local communities, government and industry. Members provide direction on what input is collected for studies and how data is interpreted. They also compare actual data with predictions and commitments made in environmental impact assessments compiled by industry.

## PROTECTING PEOPLE AND ECOSYSTEMS

The health of people and the ecosystem is a priority of the province and every concern is treated with great importance. By far, the Alberta government has the best data available provided by a long-term monitoring network, which was the first to use methods to measure ultra low levels for toxins. The results are compared to the most protective standards, ensuring the safety of everyone and everything living near oil sands development.

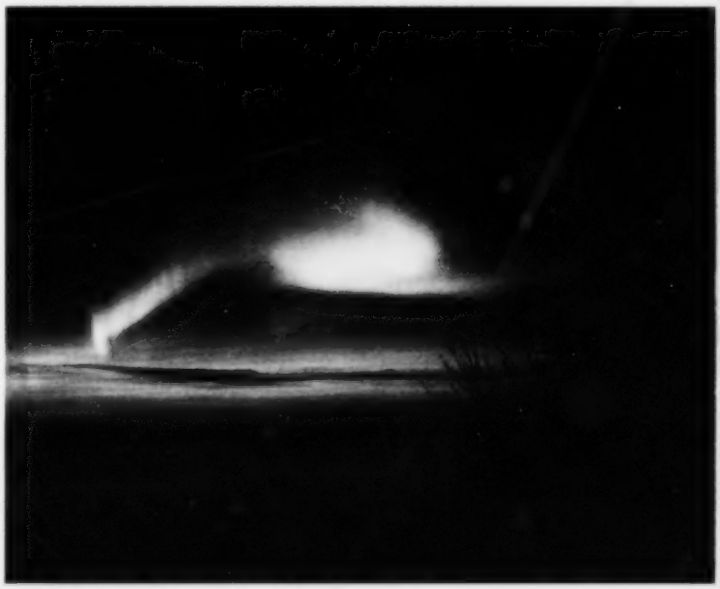
Stringent testing has consistently shown there has been no increase in concentrations of contaminants as oil sands development has progressed.

Testing has shown rivers adjacent to oil sands projects have lower contaminant levels than other rivers in the region with no industrial oil sands activity near them. The reason is that bitumen is naturally occurring in the area, so sediments from the banks of rivers are caught in the current and cause natural contaminants in the water.

The Alberta and Canadian governments are currently developing a research program to more fully examine the impacts of these natural oil sands sediments on the ecology of Lake Athabasca and its delta.

## ▸ OIL SANDS AND THE BOREAL FOREST

Alberta's boreal forest covers an area of 381,000 square kilometres (147,100 square miles). The entire mineable area in the oil sands covers 3,400 square kilometres (1,300 square miles), which is less than 1% of boreal forest area.



Northern lights over the Athabasca River.

## ▸ AIR QUALITY

The Wood Buffalo Environmental Association monitors the air in the oil sands region, 24 hours a day, 365 days a year for air quality pollutants.

Since 2005, monitoring shows improved or no change in long-term air quality for five key air quality pollutants used to calculate the air quality index: carbon monoxide, nitrogen dioxide, ozone, fine particulate matter and sulphur dioxide. Air quality was rated good 98% of the time in 2007, which is the best rating possible.

Monitoring has shown increases in hydrogen sulfide ($H_2S$) exceedance levels in the Fort McMurray area and near oil sands upgraders. Environmental protection orders are issued to the responsible companies requiring them to take appropriate steps to return $H_2S$ levels back to acceptable levels.

## ▸ MERCURY CONCENTRATIONS

Mercury concentrations in water have shown a maximum of eight parts per trillion prior to entering Lake Athabasca. The Alberta guideline, which is the most protective of any in North America, is 13 parts per trillion. To put it in perspective, one part per trillion is equivalent to one drop of detergent in enough water to fill a string of railroad tank cars 16 kilometres (10 miles) long.

## ▸ TAILINGS POND MANAGEMENT

Tailings is a term used to describe waste water from the oil sands extraction process. It is a mixture of water, sand, clay, small amounts of residual bitumen, organic compunds (e.g. napthenic acids), salt and trace metals contained in ponds or settling basins.

Tailings management remains one of the most difficult challenges for the oil sands sector to address. The design and proposed location of a pond is carefully scrutinized from an environmental, resource conservation and economic point of view.

Ensuring tailings ponds have a limited impact on groundwater and ecosystem health is crucial while research continues into new ways to accelerate the pace of reclamation. All tailings ponds are constructed with groundwater monitoring and seepage capture facilities, and are closely monitored to ensure any seepage is minimized.

As an added level of protection, interceptor ditches are constructed around tailings ponds to prevent any seepage from entering groundwater systems or waterways. Effective bird deterrence is also an important part of government's approval requirements for tailings ponds.

Research has shown potential for full reclamation (see photos below). Industry, academic institutions and government continue to examine new ways to help tailings settle more quickly, or even eliminate the need for them altogether. In 2008, the Alberta government has provided over $7 million in grants to further this research.

In June 2008, the Alberta Energy Resources Conservation Board released a set of directives that require operators to follow a new, tougher set of criteria for managing their tailings. The directives also lay out specific enforcement actions should targets not be met.

Suncor has constructed research wetlands containing consolidated tailings and release water to examine the remediation potential of wetlands and their capability to support productive plant communities. Research has shown that even the most challenging environments in oil sands development have the potential to be reclaimed.

2000 2006

Collector pipelines at a steam assisted gravity drainage (SAGD) operation.

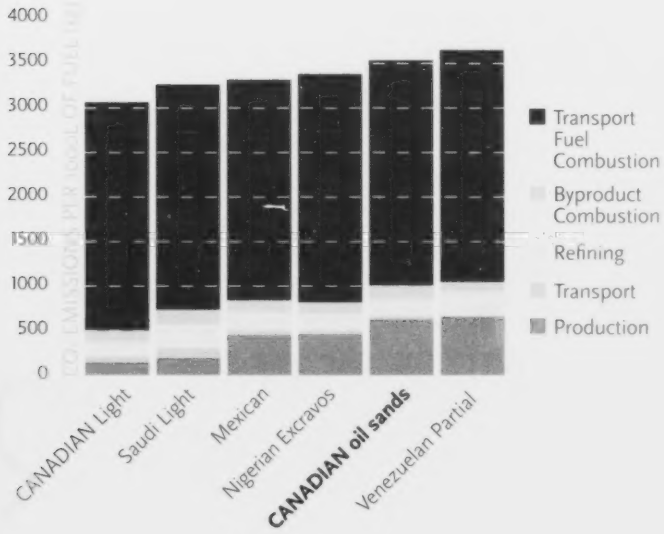
On a global scale, the oil sands account for less than one-tenth of one per cent of greenhouse gas emissions.

# ENVIRONMENTAL PROTECTION IN THE OIL SANDS

## CLIMATE CHANGE AND THE OIL SANDS

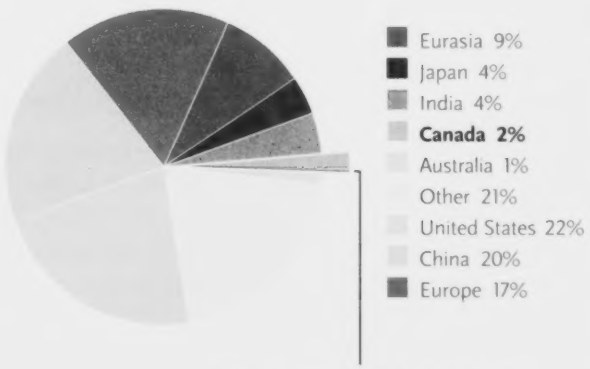
Out of the 29 billion tonnes of greenhouse gases released into the world's atmosphere each year, Canada is responsible for two per cent of these emissions. Within Canada, oil sands production accounts for five per cent of GHG emissions. Compared to other Canadian sectors, oil sands production emits 1/8 the level of transportation, 1/4 of electricity and heat generation and 1/2 of agriculture. Oil sands emissions are also about 1/2 of what the City of New York emits each year.

### 2007 GREENHOUSE GAS LIFE CYCLE ESTIMATES




Source: "Typical Heavy Crude and Bitumen Derivative Greenhouse Gas Life Cycles in 2007" (T.J. McCann and Associates)

### GLOBAL ENERGY-RELATED EMISSIONS




**Alberta's oil sands account for less than 1/10 of 1% of GHG emissions**

Source: Canadian Association of Petroleum Producers

## GREENHOUSE GAS EMISSIONS – A COMPLETE PICTURE

Extracting oil from the ground is only one part of the entire lifecycle of a barrel of oil. The complete lifecycle also considers refining, transporting and ultimately consuming the oil.

GHGs are emitted at all steps in the lifecycle. In fact, about 80 per cent of total emissions come from the end combustion of oil (e.g. out the tailpipe).

When the entire carbon footprint of oil is considered, crude from the oil sands stacks up very closely with other sources. In the case of Venezuelan crude, Canadian oil sands crude is actually less carbon intensive.

With further emission reductions Alberta will achieve through carbon capture and storage (see page 10), it is expected that emissions will drop to equal or below that of conventional oil.

# ENVIRONMENTAL PROTECTION IN THE OIL SANDS

## CLIMATE CHANGE STRATEGY

In 2008, the Alberta government laid out a new climate change plan for the province. It is a realistic and achievable plan that recognizes the importance of protecting Alberta's environment and continued economic growth.

The plan will reduce greenhouse gas emissions 50 per cent from expected levels by 2050 and will lower emissions to an equivalent of 14 per cent below 2005 levels.

By 2050, Alberta's climate change plan will reduce projected emissions by 200 million tonnes, which is the equivalent of taking 42 million cars off the road each year.

Alberta is in a unique situation—it is experiencing unprecedented growth and is a major North American energy supplier. The plan recognizes that GHG emissions will rise in the short term until 2020, while the economy is experiencing tremendous growth. But as new technology is implemented, emissions will drop.

Carbon capture and storage, energy conservation and efficiency, and greening energy production are keys to the reduction plan.

Carbon capture and storage will deliver the bulk of Alberta's reduction commitment — the largest identified and published by any province in Canada.

## CARBON CAPTURE AND STORAGE

Carbon capture and storage is a process that captures carbon dioxide ($CO_2$) emissions and stores them in geological formations deep inside the earth.

Experience in Canada and around the world has shown that carbon capture and storage is a safe technology that produces positive environmental results. It is supported by the United Nations Intergovernmental Panel on Climate Change, the International Energy Agency and the International Panel on Climate Change.

*"There has been a lot of talk lately about whose targets are toughest, or whose plan is better. While others are talking, Alberta is acting. Our climate change plan ensures environmental protection while allowing for continued economic growth. It is practical and achievable."*

*"The $2 billion we're investing is the largest amount dedicated to carbon capture and storage anywhere in the world. It's a significant commitment to make a substantial reduction in global greenhouse gas emissions."*

Alberta Premier Ed Stelmach on the province's climate change plan and carbon capture and storage investment

The same unique geology that developed the abundance of hydrocarbon resources in Alberta also makes it ideally suited to permanently store $CO_2$. Alberta's energy industry has been using the technology for more than 20 years as a method of recovering oil from depleted fields. Alberta has the experience and the technology needed for successful wide-scale implementation.

In April 2008, the Alberta government created the Alberta Carbon Capture and Storage Development Council. The council brings together experts from the public and private sector who are developing a framework for carbon capture and storage. The council's recommendations will be released in the fall of 2008.

In July 2008, the government committed $2 billion to kick-start carbon capture and storage projects in Alberta. This initiative is expected to encourage the development of facilities that will capture and permanently store up to five million tonnes of carbon dioxide per year by 2015. Applications for funding will be evaluated and a decision made by March 31, 2009.

With carbon capture and storage, emissions associated with oil sands production will fall below that of conventional oil.

Massive trucks can carry up to 400 tonnes of oil sands to separation plants in surface mining operations.

JWD Publishing/Joey Podlubny

## ▸ CALGARY HERALD – EDITORIAL JANUARY 26, 2008

The climate change plan contains two clear signals essential for industrial stability. First, although greenhouse gas emissions will continue to rise for now, it commits the provincial government to cutting by 50 per cent the emissions that would be generated if projected growth was unaccompanied by any kind of plan to limit them. Industry has its environmental goal.

Second, the government has chosen real $CO_2$ reductions, based on proven carbon capture and storage technology, rather than financial penalties for non-compliance. Good. If rising $CO_2$ levels are indeed a planetary threat, buying and selling of credits in a cap-and-trade scheme... is no remedy. Better to emit one less tonne of $CO_2$ than just move money around.

*"I see the oil sands continuing to grow in a way consistent with the government's desire to see a reduction of GHGs. We think both are achievable."*

Canadian Prime Minister Stephen Harper

*"Implement carbon capture and storage immediately. We have point emission sources and disposal reservoirs that are perfectly aligned. Don't build another coal power facility or oil sands facility that is not ready for carbon capture. Others should be transitioned to carbon capture and storage."*

Marlo Raynolds, Executive Director, Pembina Institute

# DEVELOPING THE OIL SANDS - AN ALBERTA SUCCESS

For almost 35 years, the Alberta government has proactively encouraged development of oil sands.

Through strategic investment and appropriate policies, the province has helped the oil sands generate tremendous economic benefits for the people of Alberta and Canada.

In turn, the oil being produced is contributing to North American energy security and is playing an increasingly important geopolitical role in world oil markets.

Planning began in 1974, when the Alberta government formed the Alberta Oil Sands Technology and Research Authority to develop oil sands technologies that would allow bitumen to be recovered at relatively low costs.

Almost $1 billion in seed money was distributed from 1976 to 1999, helping generate $140 billion in oil sands investment.

Fast forward to today. In 2007, the Alberta government accepted in principle a vision for the future of oil sands development. This vision, based on consultations with Albertans and recommended in the Multi-Stakeholder Committee and Aboriginal Consultation Final Reports, leads to a future that:

- honours the rights of First Nations and Métis
- provides a high quality of life
- ensures a healthy environment
- maximizes value-added industries in Alberta
- builds healthy communities
- sees Alberta benefit from the oil economy and lead in the post-oil economy
- sees Alberta as a world leader in education, technology and a skilled workforce
- provides high quality infrastructure and services for all Albertans
- demonstrates leadership through world class governance

## ▸ ALBERTA'S NEW ROYALTY FRAMEWORK

In October 2007, the Alberta government announced changes to the province's oil and gas royalty structure to ensure Albertans are receiving an increased return from the development of non-renewable energy sources.

The new framework will also allow the province to consider taking raw bitumen in lieu of cash royalties. Bitumen could then be used strategically to supply upgraders and refineries in Alberta.

Petro-Canada MacKay River in-situ operation.

## CUMULATIVE EFFECTS MANAGEMENT

The Alberta government is looking beyond oil sands development on a project-by-project basis to address the cumulative effects of development in the region.

The government is currently developing a Land-use Framework to provide a strategic blueprint for land-use management and decision-making. The draft framework proposes six regional plans for the province that will define economic, environmental and social outcomes, including a regional plan for Alberta's northeast.

The regional plan will set comprehensive, science-based targets, outcomes and actions to protect the air, land, water, wildlife and habitat.

The cumulative effects approach enables responsible resource development that secures economic prosperity while maintaining the province's commitment to environmental protection. The approach has already been implemented to manage the potential environmental pressures of upgrading bitumen in Alberta's Industrial Heartland near Edmonton.

## OIL SANDS SUSTAINABLE DEVELOPMENT SECRETARIAT

The Alberta government created an Oil Sands Sustainable Development Secretariat in 2007 to address rapid growth issues in the oil sands regions. The secretariat coordinates short-term government action on oil sands issues as well as forward looking long term planning.

This involves collaboration with industry, communities and stakeholders to address the environmental, social and economic impacts of oil sands development.

The Alberta government will present a strategic plan, based on input from Albertans, which will form a new provincial approach to proactively manage the development of the oil sands region.

### ▸ EASING GROWTH PRESSURES IN FORT MCMURRAY

- June 2008: the province started a process to develop two new communities in Fort McMurray to house 40,000 people, complete with new homes and community facilities.
- 2007-08: Alberta government committed over $815 million to address the unique infrastructure, housing, health care and education needs of the region.
- Twinning of Highway 63 from oil sands operations 240 km south towards Edmonton, which includes a new 5-lane bridge across the Athabasca River in Fort McMurray. Total expected cost to be more than $1 billion.

Fort McMurray, Alberta.

### ▸ 10-YEAR LABOUR FORCE STRATEGY

Created in 2006, *Building and Educating Tomorrow's Workforce* is the Alberta government's 10-year labour force strategy to meet skill and labour shortages and ensure the province remains globally competitive.

The strategy's priority actions and strategies were created after extensive consultations with business and industry, professional and labour organizations, education and training providers and Aboriginal groups. The strategy will put the right people with the right training in the right jobs, especially in the oil sands industry and in northeast Alberta.

# DEVELOPING THE OIL SANDS - AN ALBERTA SUCCESS

## ABORIGINAL PEOPLE AND THE OIL SANDS

Various First Nations and Métis communities exist in northeastern Alberta.

Oil sands developers must consult with First Nations in the area before development. Some First Nations representatives are also involved in multistakeholder organizations in the region, such as the Wood Buffalo Environmental Association.

In 2006, about 1,500 Aboriginal people were employed in oil sands operations, a 60 per cent increase since 1998. About 10 per cent of the oil sands workforce is made up of Aboriginal people, which reflects the region's demographics. Major oil sands companies each have Aboriginal employment policies that help place local residents into suitable positions.

In 2006, the value of contracts between oil sands companies and Alberta Aboriginal companies was $412 million.

Examples of Aboriginal companies involved in the oil sands are:

- Tech Sonics LP – an Athabasca Chipewyan First Nations company that cleans equipment using one of the largest ultrasonic cleaning tanks in North America
- Mikisew Industrial Supply Ltd – a Mikisew Cree First Nations company that manufactures web and round-style slings capable of lifting up to 45,000 kilograms
- Aqua Industrial Ltd – a Métis company specializing in the installation of steel construction and mechanical projects

About 1,500 Aboriginal Albertans work in the oil sands, either as employees or as businesses owners that supply important services to the industry.

## TECHNOLOGY IN THE OIL SANDS

The Alberta government and private industry have each invested more than $1 billion in oil sands research. This research provides more efficient, economically viable and environmentally responsible ways to develop oil sands resources.

Over the years, these efforts have also given Alberta a unique heavy oil expertise, including services, equipment and special technologies that can be exported to the rest of the world.

Alberta's commitment to energy research and technology is more important today than ever before. Combined efforts and investments of both the public and private sectors will continue to improve the environmental footprint of oil sands recovery and upgrading as the next generation of oil sands technologies emerge.

Research and commercialization collaborations are targeting new oil sands extraction methods to:

- reduce greenhouse gas emissions
- reduce natural gas use
- reduce water consumption
- improve the value of refined products derived from bitumen

### ▸ INNOVATIVE ENERGY TECHNOLOGIES PROGRAM

This program offers royalty adjustments of up to $10 million per pilot project that demonstrates the use of new or innovative technologies to increase environmentally sound recovery of reserves and responsible development.

Since 2005, $148 million has been invested by government through this program, which includes projects such as Petro-Canada Mackay River's innovative steam and gas push process.

Working on new technology.

### ▸ ALBERTA ENERGY RESEARCH INSTITUTE (AERI)

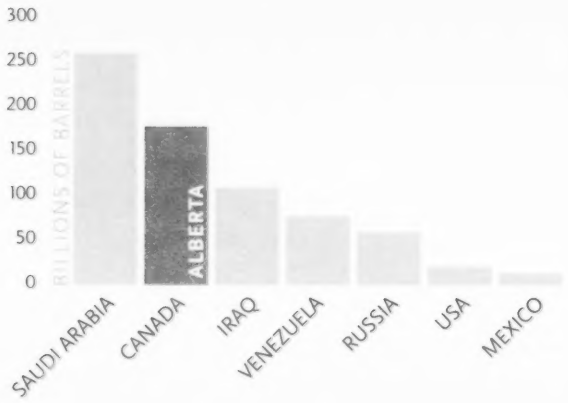
AERI works with industry and government to promote innovation and technology, which will help Alberta's energy sector to evolve. AERI provides strategic direction to position Alberta for future energy development, and invests in research and technology to enhance the sustainable development of the province's abundant energy resources.

# DEVELOPING THE OIL SANDS - AN ALBERTA SUCCESS

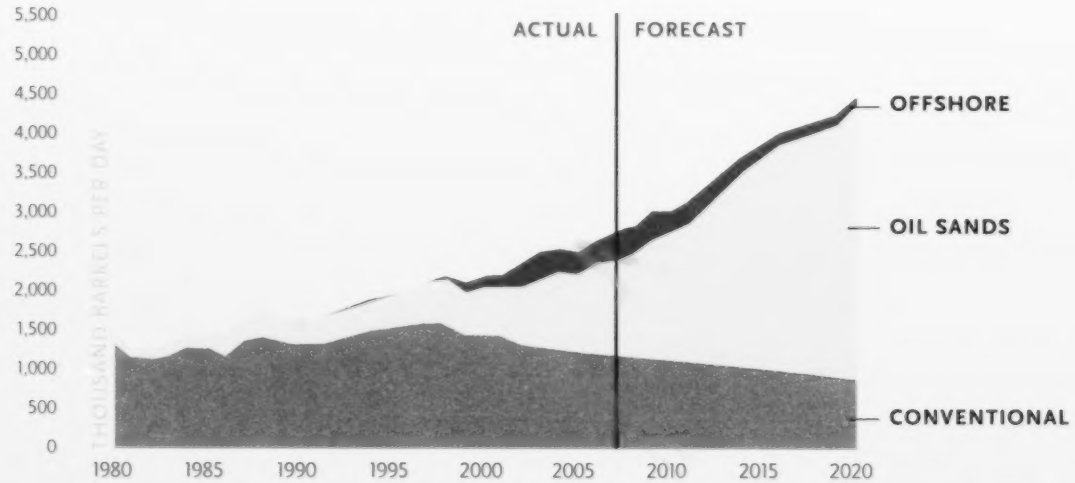
## CANADIAN ENERGY FACTS

- energy producer – 5th in the world
- crude oil producer – 7th in the world
- natural gas producer – 3rd in the world
- supplier of energy to the USA – largest in the world
- proven oil reserves of 178 billion barrels (173 billion in oil sands), 2nd in the world
- in 2007, Alberta's oil sands were the source of 64 per cent of the province's total crude oil and equivalent production and 43 per cent of all crude oil and equivalent produced in Canada

## PROVEN WORLD RESERVES OF OIL




## CANADIAN OIL PRODUCTION




Source: Canadian Association of Petroleum Producers

## ECONOMIC OPPORTUNITY

The oil sands offer an incredible opportunity to help secure the economic future of Alberta and the entire country. This potential is already being realized. Alberta is a powerhouse in the Canadian economy.

Alberta's oil sands generate revenue not only for the Alberta government, but also to the federal government through corporate and personal income taxes. This benefits all Canadians. Other provincial governments, as well as municipal governments, also receive tax revenue as a result of investment in the oil sands.

Since 1987, the province's oil and gas sector has contributed:

- almost $545 billion in GDP
- close to 2 million person-years of employment
- $117 billion in labour income

### ALBERTA ECONOMY FACTS

- highest rate of economic growth in Canada over the past 20 years
- in 2007, $16 billion was invested in oil sands projects ($67 billion since 2000)
- every dollar invested in the oil sands creates about $9 worth of economic activity globally, and $6 in direct and indirect activity in the Alberta economy
- almost 147,000 Albertans are employed in the mining, oil and gas extraction sectors
- one in 13 jobs in Alberta is directly related to energy - thousands more work in the services sector that supports the energy sector
- in 2007, unemployment rate was the lowest in Canada at 3.5%
- exports of goods and services more than doubled in the past decade to $90.5 billion

In-situ oil sands operation.

# Oil Sands Timeline

**Hundreds of millions of years ago to present – remains of dead plants and animals fossilize; exposure to heat and pressure form petroleum and other fossil fuels.**

**Early 1800s** – Commercial development of petroleum began, largely as a replacement for oils from animal sources used in oil lamps.

**1884** – Geological Survey of Canada remarks: "banks of the Athabasca River would furnish an inexhaustible supply of fuel... they have found to contain 12-15% bitumen".

**1923** – First oil sands extraction plant built near Fort McMurray.

**1929** – Dr. Karl Clark, a chemist with the Alberta Research Council, patents a hot water and caustic soda mixture to extract bitumen from oil sands.

**1930** – 300 barrels of bitumen is extracted during the summer.

**1936** – Abasand Oils Ltd. opens separation plant on the Horse River; by 1941 it was producing 200 barrels a day from May to September.

**1967** – The Great Canadian Oil Sands Project (now Suncor) opens. The $250 million project was the largest single private investment in Canadian history at the time. At capacity, it produced 45,000 barrels a day.

**1970s** – Alberta Environment begins monitoring water quality in the oil sands region.

**1971** – Alberta government forms Canada's first department of environment.

**1974** – Alberta Oil Sands Technology and Research Authority (AOSRTA), an Alberta crown corporation, is established to promote the development and use of new technology for oil sands and heavy-oil production. Almost $1 billion in seed money was distributed between 1976 and 1999; helping to generate $140 billion in oil sands investment.

**1978** – Syncrude consortium plant opens.

**1985** – Imperial Oil begins commercial operations at its Cold Lake plant; the first to use in-situ recovery methods.

**1987** – Regional Air Quality Coordinating Committee formed (becomes the Wood Buffalo Environmental Association in 1997) to coordinate a program to manage air quality in the region.

**1993** – The National Task Force on Oil Sands Strategies was formed to establish a vision for oil sands development in Alberta.

**1999** – Alberta government creates Climate Change Central; a public-private partnership to help cut $CO_2$ emissions.

1880 1890 1900 1910 1920 1930 1940 1950 1960 1970 1980 1990

**2006** – Oil sands consultations begin throughout Alberta. This series of information meetings were held to give Albertans an opportunity to add their voice into how the province's oil sands should be developed.

**2006** – A water management framework for the Lower Athabasca River is implemented, including a weekly cap limiting how much water oil sands companies can withdraw.

**2007** – Alberta becomes the first in North America to legislate mandatory GHG reductions for large industrial facilities, including in the oil sands; provides first regulated economy-wide carbon offset market.

**2000** – Aboriginal Policy Framework introduced that commits to consult with Aboriginal people when resource development decisions impact treaty rights.

**2000** – AOSTRA becomes the Alberta Energy Research Institute, with an expanded role to include other energy-related research such as wind, solar, fuel cells, clean coal and biomass.

**2000** – Cumulative Environmental Management Association is created in Fort McMurray. It brings together government, industry, environmental groups, Aboriginal peoples and others with an interest in protecting the environment in the oil sands region.

**2004** – Alberta becomes first jurisdiction in Canada to require large industry, including major oil sand emitters, to report GHG emissions.

**2004** – Oil sands production passes the million barrel per day mark.

**2007** – Alberta adopts a broad, new approach to address the cumulative effects on the environment by development projects.

2000 2001 2002 2003 2004 2005 2006 2007 2008

**2002** – Alberta is the first jurisdiction in Canada to create a comprehensive climate change plan.

**2003** – A provincial climate change management fund is created to help sectors reduce emissions and invest in Alberta energy conservation, energy efficiency and technology.

**2007** – Alberta government creates the Oil Sands Sustainable Development Secretariat and Oil Sands Environmental Management Division to address the environmental, social and economic impacts of oil sands development.

**2007** – $396 million is provided by the Alberta government to alleviate pressures of rapid growth and enhancing the quality of life in Fort McMurray.

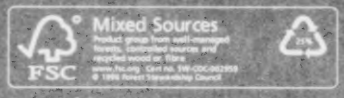
**2007** – Alberta government changes the province's oil and gas royalty structure to ensure Albertans are receiving an increased return from development of non-renewable energy sources.

**2008** – Alberta announces new climate change plan, which will reduce GHG emissions by 50% (or 200 million tonnes) by 2050 compared to business as usual projections.

**2008** – A further $420 million in funding from the Alberta government is announced for projects in Fort McMurray. Also started a process to create new communitites to house more than 40,000 people.

**2008** – $2 billion in funding from the Alberta government is announced for carbon capture and storage projects the province.

Oil sands region in northeastern Alberta.

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